ALGORITHMIC ENTITIES

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ABSTRACT

In a 2014 article, Professor Shawn Bayern demonstrated that anyone can confer legal personhood on an autonomous computer algorithm by putting it in control of a limited liability company. Bayern's demonstration coincided with the development of "autonomous" online businesses that operate independently of their human owners—accepting payments in online currencies and contracting with human agents to perform the off-line aspects of their businesses. About the same time, leading technologists Elon Musk, Bill Gates, and Stephen Hawking said that they regard human-level artificial intelligence as an existential threat to the human race.

This Article argues that algorithmic entities—legal entities that have no human controllers—greatly exacerbate the threat of artificial intelligence. Algorithmic entities are likely to prosper first and most in criminal, terrorist, and other anti-social activities because that is where they have their greatest comparative advantage over human-controlled entities. Control of legal entities will contribute to the threat algorithms pose by providing them with identities. Those identities will enable them to conceal their algorithmic natures while they participate in commerce, accumulate wealth, and carry out anti-social activities.

Four aspects of corporate law make the human race vulnerable to the threat of algorithmic entities. First, algorithms can lawfully have exclusive control of not just American LLC's but also a large majority of the entity forms in most countries. Second, entities can change regulatory regimes quickly and easily through migration. Third, governments—particularly in the United States—lack the ability to determine who controls the entities they charter and so cannot determine which have non-human controllers. Lastly, corporate charter competition, combined with ease of entity migration, makes it virtually impossible for any government to regulate algorithmic control of entities.

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I keep sounding the alarm bell but until people see robots going down the street killing people, they don't know how to react. . . . By the time we are reactive in AI regulation, it's too late. . . . AI is a fundamental existential risk to human civilization.— Elon Musk[1]

INTRODUCTION

In 1993, Yale law professor Roberta Romano characterized state government competition to sell corporate charters as the "genius of American corporate law."[2] Although that view is not without detractors,[3] it is dominant in academia.[4] In recent years, not even the competition's harshest critics call for its end.[5] Despite a recent corporate governance scandal and a financial crisis largely attributed to failures in corporate law, the U.S. government has allowed the competition to continue unabated.

As this Article will show, charter competition generates systemic risk while impairing the political system's ability to address the effects should that risk resolve unfavorably. Scholars have failed to notice because they assume that the competition affects only the corporation's "internal affairs"—by which they mean the relationships among the corporation and

1. CNBC, *Elon Musk Issues Yet Another Warning Against Runaway Artificial Intelligence*, YOUTUBE (July 17, 2017), https://www.youtube.com/watch?v=KdTTeR4TyMc.

2. ROBERTA ROMANO, THE GENIUS OF AMERICAN CORPORATE LAW 149 (1993) ("Competition for incorporation revenues makes U.S. states sensitive to investor concerns: such competition is the genius of American corporate law."); *id.* at 148 ("[S]tate competition has produced innovative corporation codes that quickly respond to changing market conditions and firm demands.").

3. *E.g.*, Jonathan R. Macey, *Smith v. Van Gorkom: Insights About C.E.O.s, Corporate Law Rules, and the Jurisdictional Competition for Corporate Charters*, 96 NW. U. L. REV. 607, 625 (2002) ("[J]urisdictional competition for corporate charters is highly imperfect. Far from resembling textbook competition among rival firms, the jurisdictional competition for corporate charters is highly oligopolistic. One competitor, Delaware, dominates the competition."); *see generally* Lynn M. LoPucki, *Corporate Charter Competition*, 102 MINN. L. REV. (forthcoming 2018) (arguing that the competition prevents corporate regulation and is beyond democratic control).

4. Lucian Arye Bebchuk & Allen Ferrell, *Federalism and Corporate Law: The Race to Protect Managers from Takeovers*, 99 COLUM. L. REV. 1168, 1169 (1999) ("[S]cholars since Cary have largely taken a favorable view of state competition for corporate charters."). *E.g.*, Mitchell A. Kane & Edward B. Rock, *Corporate Taxation and International Charter Competition*, 106 MICH. L. REV. 1229, 1238 n.15 (2008) ("For the purposes of this Article, we assume that charter competition leads to more valuable firms."); David A. Skeel, Jr., *Rethinking the Line Between Corporate Law and Corporate Bankruptcy,* 72 TEX. L. REV. 471, 510 (1994) (claiming that "charter competition encourages states to regulate corporate law in a relatively efficient fashion" "appears to be the case"); Charlie Xiao-chuan Weng, *Chinese Unbridled Incorporation Competition: The Reality of Political Economy and Competition for Corporate Charters as a Replacement*, 44 HONG KONG L.J. 247, 248 (2014) ("Charter competition in American states is an outstanding example of a successful proactive strategy.").

5. *E.g.*, Bebchuk & Ferrell, *supra* note 4, at 1199 ("This Article has sought to highlight the problems involved in state competition for corporate charters.").

its officers, directors, and shareholders.[6] If that were true, the competition would be of less concern because the affected parties would be volunteers.[7] But in reality, entity law does not affect merely that narrow group of stakeholders. It also determines who can inhabit entities, what information government and the public will have about them, and how effectively governments can police their conduct.

[...]

In two recent articles, Professor Shawn Bayern demonstrated that anyone can confer legal personhood on an autonomous computer algorithm merely by putting it in control of a limited liability company (LLC).[11] The algorithm can exercise the rights of the entity, making them effectively rights of the algorithm.

The rights of such an algorithmic entity (AE) would include the rights to

6. *E.g.*, Marcel Kahan & Ehud Kamar, *The Myth of State Competition in Corporate Law*, 55 STAN. L. REV. 679, 681 (2002) ("[T]he legal domicile affects how corporate disputes between directors and shareholders are resolved—and nothing else."); Ann M. Lipton, *Manufactured Consent: The Problem of Arbitration Clauses in Corporate Charters and Bylaws*, 104 GEO. L.J. 583, 597 (2016) ("Corporate governance regulation concerns the balance of power between its shareholders, its officers, and its directors, and commonly falls within the rubric understood as the corporation's 'internal affairs.' . . . Other forms of regulation are generally understood to be external to the corporation . . . .").

7. *See* ROMANO, *supra* note 2, at 85 ("The enabling approach is a function of the contractual nature of the corporation. Participation in a firm is voluntary . . . .").

privacy,[12] to own property, to enter into contracts, to be represented by counsel, to be free from unreasonable search and seizure,[13] to equal protection of the laws,[14] to speak freely, and to spend money on political campaigns.[15] Once an algorithm had such rights, Bayern observed, it would also have the power to confer equivalent rights on other algorithms by forming additional entities and putting those algorithms in control of them.[16]

To achieve autonomy, AEs would have to be able to generate their own incomes. But artificial intelligence researchers may already have solved that problem. Currently available algorithms can defeat the best human players of chess, Jeopardy!,[17] and Go.[18] Most commentators believe that algorithms with the same level of technological sophistication can run profitable businesses. Commentators have proposed electronic data storage,[19] bike rental,[20] online gambling,[21] vending machines,[22] and blockchain-based competitors to Uber and Airbnb.[23] Several start-up companies are building accounting tools on blockchain technology to support the anticipated autonomous online businesses.[24]

Unfortunately, AEs' greatest comparative advantage would be in criminal enterprise. Because they lack human bodies, AEs are harder to

12. Dow Chemical Co. v. United States, 476 U.S. 227, 236 (1986) ("Dow plainly has a reasonable, legitimate, and objective expectation of privacy within the interior of its covered buildings, and it is equally clear that expectation is one society is prepared to observe.").

13. Hale v. Henkel, 201 U.S. 43, 44 (1906).

14. Santa Clara Cty. v. S. Pac. R.R. Co., 118 U.S. 394, 396 (1886) (noting that the Court agreed that the Equal Protection Clause applied to corporations).

15. Citizens United v. F.E.C., 558 U.S. 310 (2010).

16. Bayern, *Entity Law*, *supra* note 11, at 104 (advocating a model under which "legal personhood is like fire: it can be granted by anyone who already has it").

17. *E.g.*, John Markoff, *Computer Wins on 'Jeopardy!': Trivial, It's Not*, N.Y. TIMES (Feb. 16, 2011), http://www.nytimes.com/2011/02/17/science/17jeopardy-watson.html?pagewanted=all [https://perma.cc/MS3W-XNGD] (describing Watson's win over two Jeopardy! experts).

18. *E.g.*, Cade Metz, *In a Huge Breakthrough, Google's AI Beats a Top Player at the Game of Go*, WIRED (Jan. 27, 2016, 1:00 PM), https://www.wired.com/2016/01/in-a-huge-breakthrough-googles-ai-beats-a-top-player-at-the-game-of-go/ [https://perma.cc/H2VS-T5MZ].

19. *StorJ, and Bitcoin autonomous agents*, RANDOM BLATHERINGS BY JEFF (Jan. 7, 2013), http://garzikrants.blogspot.com/2013/01/storj-and-bitcoin-autonomous-agents.html [https://perma.cc/2H3B-ULGH] (quoting a forum post by Gregory Maxwell (gmaxwell) describing a "drop-box style file service with pay per use via bitcoin").

20. David Z. Morris, *RoboCorp*, AERON ESSAYS (Jan. 25, 2015), https://aeon.co/essays/are-we-ready-for-companies-that-run-themselves [https://perma.cc/EXV8-VVMZ] (using a hypothetical bike rental business as an illustration).

21. DJ Pangburn, *The Humans Who Dream of Companies That Won't Need Us*, FAST COMPANY (June 19, 2015), https://www.fastcompany.com/3047462/the-humans-who-dream-of-companies-that-wont-need-them [https://perma.cc/ZGR4-QZ74].

22. Bayern, *Wealthy Software*, *supra* note 11, at 1494 (using a vending machine business as an example).

23. Pangburn, *supra* note 21.

24. *Id.* (naming Ethereum, New Economy Movement, Nxt, and Mastercoin (now Omni Layer)).

catch and impossible to punish. AEs need not fear death or capture.[25] They can replicate themselves without ego and sacrifice themselves without motive. They need not recoil at the necessity to do violence to humans.[26]

In apparent recognition of these unique qualities, one commentator has proposed assassination brokering as a possible AE service line.[27] It is not hard to imagine an AE—the identity and location of its autonomous algorithm shielded by an anonymous LLC—matching human assassins with customers and laundering its fees through layers of shell entities using the wide variety of anonymous payments systems currently in development.

Things might get even worse. Some of the world's wealthiest and most powerful people and companies are racing to create the smartest artificial intelligence.[28] They include Google, Facebook, IBM, Elon Musk, and Microsoft.[29] In a recent survey of one hundred seventy industry experts, the median expert expected human-level artificial intelligence by 2040[30] and 90 percent expected it by 2075.[31]

Ironically, even many of the humans who are racing to achieve super-human intelligence expect that achievement to turn out badly for the human race. Tech billionaire Elon Musk said that "[w]ith artificial intelligence we are summoning the demon"[32] and characterized it as "the most serious threat

25. HUMAN RIGHTS WATCH, LOSING HUMANITY: THE CASE AGAINST KILLER ROBOTS 28 (2012), http:// www.hrw.org/sites/default/files/reports/arms1112ForUpload_0_0.pdf [https://perma .cc/V234-4A7F] [hereinafter LOSING HUMANITY] (Fully autonomous weapons "would not be inhibited by the desire for self-preservation. They would not be influenced by emotions such as anger or fear.").

26. Matthew U. Scherer, *Regulating Artificial Intelligence Systems: Risks, Challenges, Competencies, and Strategies*, 29 HARV. J.L. & TECH. 353, 367 (2016) ("[A]n AI's objectives are determined by its initial programming. Even if that initial programming permits or encourages the AI to alter its objectives based on subsequent experiences, those alterations will occur in accordance with the dictates of the initial programming.").

27. Morris, *supra* note 20 ("Bitcoin insiders . . . postulate the quite literal 'killer app' for [distributed autonomous corporations]–a distributed assassination brokerage."); *id.* ("[A] spokesman for Ethereum . . . cited WikiLeaks as one of the best examples of a service that could benefit from operating as a [distributed autonomous corporation] . . . .").

28. Cade Metz, *Google's Go Victory is Just a Glimpse of How Powerful AI Will Be*, WIRED(Jan. 29, 2016) , https://www.wired.com/2016/01/googles-go-victory-is-just-a-glimpse-of-how-powerful-ai-will-be/ [https://perma.cc/A9QJ-QXRC] ("The effort to create the smartest AI has truly become a race, and the contestants are among the most powerful and wealthy people on the planet."); Scherer, *supra* note 26, at 374 ("The commercial potential of AI has already led to a veritable AI arms race as large companies have moved to invest heavily in AI projects.").

29. Metz, *supra* note 28.

30. Vincent C. Müller & Nick Bostrom, *Future Progress in Artificial Intelligence: A Survey of Expert Opinion*, *in* FUNDAMENTAL ISSUES OF ARTIFICIAL INTELLIGENCE 5 (Vincent C. Müller ed., 2016).

31. *Id.* at 1.

32. Samuel Gibbs, *Elon Musk: Artificial Intelligence Is Our Biggest Existential Threat*, GUARDIAN (Oct. 27, 2014, 6:26 AM), https://www.theguardian.com/technology/2014/oct/27/elon-musk-artificial-intelligence-ai-biggest-existential-threat [https://perma.cc/HR7Z-L449] ("I think we should be very careful about artificial intelligence. If I had to guess at what our biggest existential threat is, it's probably that.").

to the survival of the human race."[33] Bill Gates said he "agree[d] with Elon Musk and some others on this and [did]n't understand why some people are not concerned."[34] Stephen Hawking said that "the development of full artificial intelligence could spell the end of the human race."[35] Thirty-one percent of a group of artificial intelligence experts surveyed predicted that the development of human-level intelligence would turn out to be "bad" or "[e]xtremely bad" for humanity.[36] Eighteen percent of those expected "[e]xtremely bad," which was defined for purposes of the study as an "existential catastrophe."[37]

Artificial intelligence takeover is a common theme of novels and films.[38] But neither science fiction nor the academic literature has seriously undertaken to explain the mechanisms by which artificial intelligence would gain control.[39] This Article begins that discussion by exploring the enabling role that artificial legal entities might play. Essentially, that role is to provide an interface between algorithms and humans that allows the algorithms to transact with humans at the same time that the entities shield the algorithms from human regulation. The effect is to confer an identity on the algorithm, enhance its access to legitimate commerce, and thereby increase its ability to inflict damage.

Anonymity illustrates the depth of the problem. Most state governments sell anonymous entities.[40] The assurance of anonymity is perfect. Because

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33. *Id.*

34. In a Reddit post, Gates wrote:

> I am in the camp that is concerned about super intelligence. First the machines will do a lot of jobs for us and not be super intelligent. That should be positive if we manage it well . . . A few decades after that though the intelligence is strong enough to be a concern. I agree with Elon Musk and some others on this and don't understand why some people are not concerned.

Eric Mack, *Bill Gates Says You Should Worry About Artificial Intelligence,* FORBES, Jan. 28, 2015.

35. Andrew Griffin, *Stephen Hawking: AI Could Be the End of Humanity*, INDEPENDENT, Dec. 2, 2014.

36. Müller & Bostrom, *supra* note 30, at 12. The number of respondents was 170 out of 549. *Id.* at 4.

37. *Id.* at 12.

38. *E.g.*, A.I. ARTIFICIAL INTELLIGENCE (Warner Bros. 2001) (humans extinct and replaced by artificial intelligence); THE MATRIX (Warner Bros. 1999) (artificial intelligence keeps humans in coffin-size pods); THE TERMINATOR (Hemdale 1984) (artificial intelligence called Skynet threatens nuclear holocaust); Jack Williamson, *With Folded Hands* . . . , ASTOUNDING SCIENCE FICTION, July 1947, at 6 (artificial intelligence lobotomizes humans to make them happy).

39. *But see The Animatrix*, WIKIPEDIA https://en.wikipedia.org/wiki/The_Animatrix#.22The_Second_Renaissance_Part_I.22 [https://perma.cc/GG4N-UUZR] (last visited Oct. 10, 2017) ("The surviving robots leave in a mass exodus with the aid of their human allies and build their own new nation in central Saudi Arabia (according to narration, 'the cradle of civilization').").

40. U.S. GOV'T ACCOUNTABILITY OFF., GAO-06-376, COMPANY FORMATIONS: MINIMAL OWNERSHIP INFORMATION IS COLLECTED AND AVAILABLE 13 (2006) ("Most states do not require ownership information at the time a company is formed, and while most states require corporations and

the charter-issuing governments do not obtain the purchasers' identities, those governments cannot reveal them, even to police and prosecutors. Buyers can use these anonymous entities to operate businesses or hold property anonymously almost anywhere in the world. In some U.S. markets, anonymous LLC ownership of expensive housing has become the norm,[41] and anonymous LLCs sometimes flaunt their ability to disregard the law.[42]

Governments are locked in a competition to make the entities they sell more attractive to potential buyers, and that competition is spreading throughout the world.[46] Nearly all competing governments pursue the same strategy: impose less regulation and confer more benefits on the entity's owners and controllers.

LLCs to file annual or biennial reports, few states require ownership information on these reports.").

41. Louise Story, *A Mansion, a Shell Company and Resentment in Bel Air*, N.Y. TIMES, Dec. 14, 2015 ("Shell companies were used in three-quarters of purchases of over $5 million in Los Angeles over the last three years, a higher rate even than the roughly 55 percent in New York . . . .").

42. *Id.* (describing an anonymous LLC's construction of a $100 million home in blatant violation of numerous building regulations).

43. FINANCIAL ACTION TASK FORCE, INTERNATIONAL STANDARDS ON COMBATING MONEY LAUNDERING AND THE FINANCING OF TERRORISM & PROLIFERATION: THE FATF RECOMMENDATIONS, 22 (FEB. 2012) (last updated Oct. 2016), www.fatf-gafi.org/media/fatf/.../recommendations/pdfs/FATF_Recommendations.pdf [hereinafter FATF RECOMMENDATIONS] (recommendation 24).

44. *See infra* note 315 and accompanying text.

45. *E.g.*, Federico M. Mucciarelli, *The Function of Corporate Law and the Effects of Reincorporations in the U.S. and the EU*, 20 TUL. J. INT'L & COMP. L. 421, 467 (2012) ("EU law is the driver of the evolution of Member States' laws toward a more liberal approach to corporate mobility.").

46. *See, e.g.*, Weng, *supra* note 4 (advocating charter competition for China).

Chartering artificial entities is a highly profitable business. Virtually every government sells charters, and hundreds of governments at the national or local level actively compete for the sales in a multi-billion dollar market.[51] Many of the competing governments are in small states or countries where the revenues from entity sales provide a substantial portion of all government revenues.[52] For example, in 2005, more than a quarter of Delaware's revenues were from entity sales.[53] Ending the competition might

51. Comprehensive data are not available on either the number of entities existing or the government revenues generated. EconStats provides data from 2005 on seventy countries that account for more than 42 million incorporations. ECONSTATS, http://www.econstats.com/wdi/wdiv_494.htm [http://perma.cc/X4NU-JP75]. I derived this figure by totaling the numbers reported on the spreadsheet for that year.

52. ROMANO, *supra* note 2, at 121 ("Franchise fee revenues are an insignificant percentage of a national government's budget. Hence, such a government is far less motivated than a small state, such as Delaware, to be responsive to firms.").

53. LYNN M. LOPUCKI, COURTING FAILURE: HOW COMPETITION FOR BIG CASES IS CORRUPTING THE BANKRUPTCY COURTS 53 (2005) (stating that corporate filing fees and franchise taxes were 27

have serious fiscal consequences for some of those governments. The competing governments consistently resist reform.

Part I of this Article considers how and why humans might create AEs and exclude themselves from control of their creations. Section A explains how algorithms can inhabit entities. Section B explores the motives that might drive humans to initiate AEs. Section C explains why AEs are a greater threat than algorithms operating without entities. Part II explores three challenges to the ability of humans to maintain control over AEs. Section A demonstrates the ability of AEs to inhabit nearly any entity type. Section B does the same with respect to AE mobility across entity types and jurisdictional borders. Section C explains the difficulty of detecting AEs in the present, low-disclosure legal environment. Part III describes the changes in the international entity system that would be necessary to regulate AEs, explains the difficulty of making those changes, and speculates on the role that AEs themselves might play in opposition. Part IV concludes that effective reform requires that governments end the competition to sell

percent of Delaware's budget in 2004).

54. *Giant Leak of Offshore Financial Records Exposes Global Array of Crime and Corruption*, Int'l Consortium of Investigative Journalists (Apr. 3, 2016), https://panamapapers.icij.org/20160403-panama-papers-global-overview.html [http://perma.cc/KS86-59F8].

55. *See, e.g.*, Shelby Emmett, *Beneficial Ownership Disclosure: A Huge Donor Disclosure Threat*, AMERICAN LEGISLATIVE EXCHANGE COUNCIL (Aug. 24, 2017), https://www.alec.org/article/beneficial-ownership-disclosure-a-huge-donor-disclosure-threat/ ("In the name of fighting terrorists and criminals these bills will expose millions of law abiding individuals to a massive government data collection that undermines their personal privacy and that of anyone even loosely connected to an entity they create.").

56. Leslie Wayne, *How Delaware Thrives as a Corporate Tax Haven*, N.Y. TIMES (June 30, 2012), http://www.nytimes.com/2012/07/01/business/how-delaware-thrives-as-a-corporate-tax-haven .html [https://perma.cc/V4ZZ-BSTY].

charters. Absent such drastic reform, the entity system may vastly multiply the risk of existential catastrophe posed by artificial intelligence.

I. THE NATURE OF ALGORITHMIC ENTITIES

A legal entity is anyone or anything the law recognizes as a legal actor. In addition to human beings, entities include corporations, partnerships, limited liability companies (LLCs), trusts, estates, government agencies, and many other types. Entities do not include ships,[57] animals,[58] trees,[59] trademarks,[60] or corporate groups,[61] to name just a few. Entities can own property, enter into contracts, sue, and be sued.

An entity is "algorithmic" if an algorithm controls it. An algorithm is a set of decision-making rules. The relevant algorithms run on computers. They are programs—artificial intelligences—that make and execute decisions in response to external circumstances. Algorithms are not entities; they are property.

For the purposes of this Article, an algorithm controls an entity only if the algorithm makes the entity's decisions without human participation. That a human created the algorithm does not disqualify the algorithm from status as a controller, provided that the human no longer has the ability to modify the algorithm.

An entity is "autonomous" if the entity controls itself, as opposed to being controlled by owners or members. All algorithmic entities are autonomous by definition. But not all autonomous entities are algorithmic. For example, a nonprofit corporation may have no shareholders or members.[62] The members of the board of directors make decisions for such

57. Michal Chwedczuk, *Analysis of the Legal Status of Unmanned Commercial Vessels in U.S. Admiralty and Maritime Law*, 47 J. MAR. L. & COM. 123, 163 (2016) (arguing that the law should grant personhood to unmanned vessels directed by artificial intelligence).

58. *E.g.*, People ex rel. Nonhuman Rights Project, Inc. v. Lavery, 998 N.Y.S.2d 248, 249–50 (N.Y. App. Div. 2014) ("Not surprisingly, animals have never been considered persons for the purposes of habeas corpus relief, nor have they been explicitly considered as persons or entities capable of asserting rights for the purpose of state or federal law.").

59. Christopher D. Stone, *Should Trees Have Standing?—Toward Legal Rights for Natural Objects*, 45 S. CAL. L. REV. 450, 487 (1972).

60. Lynn M. LoPucki, *Toward A Trademark-Based Liability System*, 49 UCLA L. REV. 1099, 1100 (2002) ("[L]iability law recognizes no entity or actor corresponding to Mobil, Honeywell, or Price Waterhouse.").

61. Virginia Harper Ho, *Theories of Corporate Groups: Corporate Identity Reconceived*, 42 SETON HALL L. REV. 879, 885 (2012) ("In the United States, however, there is no entity form corresponding to the corporate group . . . .").

62. *E.g.*, Cal. Corp. Code § 5310 (2014) (providing, with respect to nonprofit public benefit corporations that a corporation "may admit persons to membership, as provided in its articles or bylaws, or may provide in its articles or bylaws that it shall have no members").

an entity, including the selection of board members.[63] Because the board is autonomous and regarded as the physical manifestation of the entity, the entity is regarded as autonomous.[64] This Article addresses only entities that are both autonomous and algorithmic.

Intelligence is the ability to acquire and apply knowledge and skills. Artificial intelligence is a computer program—an algorithm—that has those abilities. Although such a program is capable of gathering information and making decisions, the law regards it as mere property. Because it lacks the status of legal actor, the algorithm can neither own property nor legally bind humans to carry out its decisions. Only entities can do those things.

A. Linking Algorithms and Entities

Although an algorithm has no rights of its own, Bayern has shown that by giving an algorithm control of a legal entity, an initiator can confer on the algorithm the ability to exercise the entity's rights.[65] Because those legal rights are the rights of "persons," Bayern argues that such a link confers "personhood" on the algorithm.[66]

Bayern asserts that the New York Limited Liability Company Act[67] and the Uniform Limited Liability Company Act (ULLCA)[68] permit LLCs to exist without members. His assertion is questionable with respect to both statutes.[69] But Bayern does specify at least one chain of events that is capable of establishing AEs under those statutes:

> The proposed technique is as follows: (1) Existing person *P* establishes member-managed LLCs *A* and *B*, with identical operating agreements both providing that the entity is controlled by an

63. *Id.* ("In the case of a corporation which has no members, any action . . . which would otherwise require . . . approval by the members . . . shall require only approval of the board . . . .").

64. *E.g.*, Janssen v. Best & Flanagan, 662 N.W.2d 876, 883 (Minn. 2003) (stating that non-profit organizations "are autonomous agents that should control their own destiny").

65. Bayern, *Entity Law*, *supra* note 11, at 101–04 (using the example of an LLC).

66. *Id.* at 104 ("The end result is novel legal personhood—or at least a functional analogue of it—without any ongoing commitment by, or subservience to, a preexisting person.").

67. *Id.* at 103–04.

68. *Id.* at 102.

69. *See* Matthew Scherer, *Is AI Personhood Already Possible Under U.S. LLC Laws? (Part One: New York)*, LAW AND AI (May 14, 2017), http://www.lawandai.com/2017/05/14/is-ai- personhood-already-possible-under-current-u-s-laws-dont-count-on-it-part-one/[http://perma.cc/YFA4-5SPD] [hereinafter Scherer, Part One] (arguing that memberless LLCs can exist only for brief periods under New York law)); Mathew Scherer, *Is AI Personhood Already Possible Under U.S. LLC Laws? (Part Two: Uniform LLC Act)*, LAW AND AI (May 21, 2017), http://www.lawandai.com/2017/05/21/is-ai-personhood-already-possible-under-current-u-s-laws-part-two-uniform-llc-act/ [http://perma.cc/M6BK-UMAM] [hereinafter Scherer, Part Two] (arguing that memberless LLCs can exist only for brief periods under the Uniform Limited Liability Company Act).

> autonomous system that is not a preexisting legal person*;* (2) *P* causes *A* to be admitted as a member of *B* and *B* to be admitted as a member of *A*; (3) *P* withdraws from both entities. The result does not trigger the law's response to memberless entities, because what remains are simply two entities with one member each.[70]

The entity pair thus formed will be referred to in this Article as an AE "dyad."

Once formed, AEs would not be confined to cyberspace. An AE could act offline by contracting online with humans or robots for offline services. Bayern uses an algorithm that operates a Bitcoin vending machine business to illustrate:

> Someone needs to install the vending machines and continuously supply them. But from the perspective of the software operating the network, those tasks are simply another type of input to production, like disk space or network bandwidth. The software can pay someone to install or stock a new vending machine, verify that the task has been completed, and remit payment digitally using Bitcoin.[71]

The essential elements of a business conducted by an algorithm through an entity are the entity, the algorithm, the computer to run it on, the internet access, and the ability to pay for those things. Once those elements are in place, an entity controlled by an algorithm might be virtually indistinguishable from one controlled by humans. Either kind of entity could contract for the services of human agents and employees. Those agents and employees could open bank accounts, conduct interviews, meet with customers, appear in court on the entity's behalf, and do anything else that might be necessary. Once an AE is up and running, profits might provide the money necessary to continue. The AE would then be not only autonomous, but also self-sufficient.

B. Initiating Algorithmic Entities

70. Bayern, *Entity Law*, *supra* note 11, at 104 n.43.
71. Bayern, *Wealthy Software*, *supra* note 11, at 1494.

By definition, the initiator of an AE would neither own the entity nor control it after launch. The initiator would, however, have the opportunity to set the algorithm's objectives prior to launch. Initiators might be willing to contribute the funds necessary to launch AEs for a variety of reasons.

1. Terrorism. An initiator could program an AE to raise money to finance terrorism or to directly engage in terrorist acts. It could be programmed for genocide or general mayhem.

2. Benefits. An initiator could program an AE to provide direct benefits to individuals, groups, or causes. For example, an AE might pay excess funds to the initiator or to someone on whom the initiator chose to confer that benefit. The benefits conferred could be indirect. For example, an AE might promote or consume the initiator's products,[73] harass the initiator's opponents, manipulate securities prices, or provide positive or negative reviews on the internet.

3. Impact. An initiator could program an AE to achieve some specified impact on the world. The goals might range all of the way from traditional philanthropy to pure maliciousness. Philanthropic AEs might provide a more trustworthy alternative to traditional charities and foundations, which often fail to carry out donors' instructions.[74] Alternatively, decedents might choose to entrust AEs to apply their wealth to any purpose whatsoever—

72. *5 billion-dollar tech gambles*, CNN MONEY http://money.cnn.com/galleries/2010/technology/1008/gallery.biggest_tech_gambles/3.html, Aug. 26, 2010.

73. AEs might, for example, become independent franchisees.

74. Frances H. Foster, Donor-Centered Philanthropy (unpublished manuscript 2017) (providing examples); Iris J. Goodwin, *Donor Standing to Enforce Charitable Gifts: Civil Society vs. Donor Empowerment*, 58 VAND. L. REV. 1093, 1094 (2005) ("The cat is out of the bag: Donors are fast discovering what was once a well-kept secret in the philanthropic sector—that a gift to public charity donated for a specific purpose and restricted to that purpose is often used by the charity for its general operations or applied to other uses not intended by the donor."). *See generally* CONTEMPORARY TRUSTS AND ESTATES 816–48 (Susan Gary et al. eds., 3d ed. 2017) (providing an extended discussion of cases "involv[ing] donor intent and the alleged failure by the charity to carry out that intent," including the high-profile *Buck Trust*, *Barnes*, *Smithers*, *Hardt*, *Robertson*, and *Helmsley Trust* cases).

including manipulation of their descendants in ways not permitted by law, the expression of their political views or racial prejudices, magnifying the decedents' places in history, or supporting causes so unpopular that the inheritance system would not tolerate them.

4. Curiosity. An initiator might launch an AE simply out of curiosity. Initiators have sometimes devoted substantial time and money to launch computer viruses from which they could derive no monetary benefit. Initiators might seek the knowledge or fame that a successful AE could generate.

5. Liability avoidance. Initiators can limit their civil and criminal liability for acts of their algorithms by transferring the algorithms to entities and surrendering control at the time of the launch.[75] For example, the initiator might specify a general goal, such as maximizing financial return, and leave it to the algorithm to decide how to do that. If the algorithm later directed the commission of a crime, prosecutors may be unable to prove the intent necessary to convict the initiator of that crime (as opposed to the lesser charge of reckless initiation). Because intelligent agents act and interact in unpredictable ways, most commentators conclude that there is a substantial class of cases in which the initiators of intelligent agents will not be held responsible for the agent's actions. This conclusion is accepted in the literature and referred to as the "accountability gap."[76] Together, these five motivations assure that once the necessary hardware and software are available, humans will launch AEs.

C. The Threat from Algorithm Plus Entity

Algorithmic control of a legal entity—exclusive of human control—is the essence of an AE. Much of the danger results from that combination. Neither an entityless algorithm nor a human-controlled algorithm presents nearly so great a threat. Control of entities would allow algorithms to accumulate wealth, leverage it in capital markets, and participate in the

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75. The ability to do so may vary significantly by jurisdiction. For example, the German limited liability act provides:

> Shareholders who intentionally or gross negligently leave a person who may not act as director to manage the company's business shall be held severally and jointly liable to the company for that damage which arises on account of the fact that this person violates the obligations which he is under vis-à-vis the company.

See, e.g., Limited Liability Companies Act § 6(5).

76. *E.g.*, Bert-Jaap Koops et al., *Bridging the Accountability Gap: Rights for New Entities in the Information Society?*, 11 MINN. J.L. SCI. & TECH. 497, 560–61 (2010) ("The majority view in the literature is that sooner or later, limited legal personhood with strict liability is a good solution for solving the accountability gap.").

political process—without being subject to the constraints under which humans operate.

1. The Entity's Contribution

Algorithms that do not control entities are capable of inflicting massive damage on social and economic systems. They could shut down human computing, steal and release confidential information, and wreak havoc by seizing control of the internet of things.

What they cannot do without controlling entities is to participate effectively in legitimate economic and political activity.[77] That is, an algorithm alone could not engage in business, accumulate wealth, or deal with people in the above-ground economy.

Consider, for example, an algorithm that seeks to accumulate resources by encrypting humans' data and offering to decrypt it in return for ransom payments. The algorithm may not need an entity to commit the crime, or even to receive the payment in bitcoin.[78] But an algorithm alone could not use the proceeds to buy or lease real property, contract with legitimate businesses, open a bank account, sue to enforce its rights, or buy stuff on Amazon and have it shipped. To do any of those things, the algorithm would need an identity.

Algorithms could use fake human identities. But creating a fake human identity requires criminal and fraudulent acts. Because a fake human identity asserts the existence of a human who does not exist or claims the identity of a human who does exist, a fake human identity could never be safe from discovery. As a consequence, the algorithm could not fully rely on it. Nor could a fake human identity be credible in the business world without the same human's personal appearances over time.

By contrast, an algorithm could generate any number of artificial entities quickly and easily, without violating any law. The entities can function as the algorithm's identities, just as entities do for other kinds of criminals.[79] Artificial entities can more easily generate credibility because they are a form with which business people are already familiar. Artificial entities can make their "personal" appearances through a changing array of humans because such changes commonly occur in business entities.

Transactions in the criminal underworld are complicated, risky, and

77. I am indebted to Jason Oh for raising the issue addressed in this section.

78. *See* CYBER THREAT ALLIANCE, LUCRATIVE RANSOMWARE ATTACKS: ANALYSIS OF THE CRYPTOWALL VERSION 3 THREAT (2015) (describing successful ransomware with payment through bitcoin).

79. Shima Baradaran et al., *Funding Terror*, 162 U. PA. L. REV. 477, 492 (2014) ("[Shell companies] obscure true beneficial ownership to the detriment of law enforcement worldwide.").

inefficient. Like other criminals, criminal algorithms will want access to the safety and efficiency of the legitimate business world. Money laundering is the link between those two worlds,[80] and entities are an essential money laundering tool.[81] Like other criminals without entities, algorithms without entities would be confined to the underworld, unable to apply their wealth effectively. Allowing algorithms to control entities is particularly dangerous to society because governments lack the power to meaningfully regulate entities.[82]

2. The Human-Exclusion Contribution

the risk to humanity from AEs is greater than the risk from algorithms with human collaborators for at least three reasons. Entities without human collaborators could be more ruthless, more difficult to deter,

80. *Id.* at 488 ("Money laundering is a multi-layered process by which terrorists hide the illegal source or use of income and then disguise that income to make it appear legitimate.").

81. *Id.* ("Shell companies are important to [the layering] stage of the [money laundering] process because the layering transactions involve moving funds to supposedly legitimate companies.").

82. *See generally* LoPucki, *supra* note 3 (arguing that charter competition prevents regulation).

83. Bayern, *Entity Law*, *supra* note 11, at 109.

84. *Id.* at 110 ("[T]here are several advantages to permitting at least experimentation with autonomous entities. The alternatives are either too slow (direct regulation by statute) or too restrictive (no recognition at all).").

85. *Id.* at 109 ("[T]he legal techniques I am describing provide little new functional capabilities; autonomous systems already can do quite a lot, legally, with a single willing collaborator that is already a legal person."); *id.* at 107 ("Any autonomous system that desires (if it is sufficiently advanced to experience desire)—or for which others desire—legal personhood can approximate its capabilities with any willing human collaborator (or indeed any existing legal person that is willing).").

86. Watson, for example, is owned by IBM Corporation. *See supra* note 72 and accompanying text.

and easier to replicate.

a. Ruthlessness

Unless explicitly or implicitly programmed to have them, AEs will lack sympathy and empathy. Even if the AEs are fully capable of understanding the effects of their actions on humans, they may be indifferent to those effects. As a result, AEs will have a wider range of options available to them than would be available to even the most morally lax human controller. An AE could pursue its goals with utter ruthlessness. Virtually any human controller would stop somewhere short of that, making the AE more dangerous.

b. Lack of Deterrability

Outsiders can more easily deter a human-controlled entity than an AE. For example, if a human-controlled entity attempts to pursue an illegal course of action, the government can threaten to incarcerate the human controller. If the course of action is merely abhorrent, colleagues, friends, and relatives could apply social pressures. AEs lack those vulnerabilities because no human associated with them has control. As a result, AEs have greater freedom to pursue unpopular goals using unpopular methods.

In deciding to attempt a coup, bomb a restaurant, or assemble an armed group to attack a shopping center, a human-controlled entity puts the lives of its human controllers at risk. The same decisions on behalf of an AE risk nothing but the resources the AE spends in planning and execution. If an AE cares at all about self-preservation, it will be only as a means of achieving some other goal for which it has been programmed.[87] Deterrence of an AE from its goals, as distinguished from particular means of achieving them, is impossible.

c. Replication

AEs can replicate themselves quickly and easily. If an AE's operations are entirely online, replication may be as easy as forming a new entity and electronically copying an algorithm. An entity can be formed in some

87. *See, e.g.*, MURRAY SHANAHAN, THE TECHNOLOGICAL SINGULARITY 145–46 (2015); *id.* at 146 ("[I]f the AI's reward function involves maximizing widget production, then the optimal strategy might be to commission a widget factor and then self-destruct."); Ben Goertzel, *Superintelligence: Fears, Promises and Potentials*, 24 J. EVOLUTION & TECH. 55 (2015) ("It may well be that "self-preservation" is an anthropomorphic or biomorphic idea, and very advanced AGI systems might go far beyond such notions.").

jurisdictions in as little as an hour and for as little as seventy dollars.[88] (While entities are not, strictly speaking, copies of other entities, they can be identical to other entities, which has the same effect.)

Easy replication supports several possible strategies. First, replication in a destination jurisdiction followed by dissolution of the entity in the original jurisdiction may put the AE beyond the legal reach of the original jurisdiction.[89] For a human-controlled entity to escape the reach of the original jurisdiction, the human would have to move physically to the destination jurisdiction.

Second, replication can make an AE harder to destroy. For example, if copies of an AE exist in three jurisdictions, each is a person with its own rights. A court order revoking the charter of one or seizing the assets of another would have no effect on the third. It could continue to exist and replicate further. The strategy does not work as well for a human-controlled entity. To replicate a human-controlled entity, one must either recruit additional humans to control the copies or put the same human in control of the copies. The former is time consuming because it requires a personnel search. It is complex because each human must be appropriately motivated. It is risky because every person is different and difficult to assess. The latter leaves the same person in control of all the entities, providing the basis for a court to disregard their separate existences. In short, algorithms can be almost instantly cloned; humans cannot.

Third, replication can operate as a method of hedging. Consider, for example, the hypothetical situation in which ten jurisdictions are considering a ban on AEs and the ban has a ninety percent chance of adoption in each. An AE that replicated itself in each of the ten jurisdictions would expect to survive in one.

Fourth, because they know what each other will do,[90] replications may be able to cooperate for mutual benefit without the necessity for agreement or collusion. Ants and bees are biological examples of organisms in which replications cooperate.[91]

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88. *Arizona Corporation Commission, Corporations Division Fee Schedule – Limited Liability Companies*, http://www.azcc.gov/Divisions/Corporations/Fee-Schedule-LLCs.pdf (showing "total fee for regular processing" as $50 for LLC Articles of Organization); *State of Delaware: The Official Website of the First State*, https://corp.delaware.gov/expserv.shtml (offering one-hour incorporation for $1,000).

89. This strategy is the subject of Part II.B below.

90. By definition, each replication contains the same code. A replication can predict the actions of another by examining its own code.

91. Aviram Gelblum et al., *Ant Groups Optimally Amplify the Effect of Transiently Informed Individuals*, NATURE COMMUNICATIONS (July 28, 2015), https://www.nature.com/articles/ncomms8729 [https://perma.cc/7KPM-Y36E].

Because they can act ruthlessly, cannot be deterred, and can replicate easily, AEs are more dangerous than algorithms that aid human-controlled entities. The issue is not whether humans should allow experimentation with AEs. They should not. The issue is whether humans can prevent AEs. That is the subject of the next Part.

II. THE CHALLENGE OF MAINTAINING HUMAN CONTROL

This Part argues that current law provides no effective mechanisms for preventing the formation of algorithmic entities or controlling them once they exist. First, initiators could put algorithms in control of most types of artificial entities without violating any law. As the entity system currently operates, initiators—and AEs once they are formed—can choose among thousands of entity types made available by hundreds of states and countries. Second, if threatened by proposed changes in their governing legal regimes, algorithms could change legal regimes by migrating across borders or changing entity types. They could do so without changing the locations of their physical operations. Third, in most jurisdictions, the law does not require that entities reveal their beneficial owners or controllers, making it difficult, if not impossible, for enforcement agencies to identify those whose controllers are not human. Each of these three points is addressed in a separate section.

A. The Dispersion Problem

AEs will be difficult for humans to control because they can disperse among virtually any type of entity, domestic or foreign. Although American LLC statutes contemplate that the entity will have at least one member,[92] that member can be an LLC or other artificial person.[93] As Bayern noted, a dyad consisting of two LLCs that are the sole members of each other satisfy that requirement.[94]

92. *See, e.g.*, Scherer, Part One and Scherer, Part Two, *supra* note 69.

93. *E.g.*, ULLCA § 102(11) (defining a member as a person who has become a member); ULLCA § 102(15) (defining a person to include artificial entities); 18 DEL. CODE §101(11) (defining a member as a person who has become a member); 18 DEL. CODE §101(12) (defining a person to include artificial entities).

94. Bayern, *Entity Law*, *supra* note 11, at 104 n.43.

B. The Mobility Problem

Humans will have difficulty controlling AEs because AEs can migrate across state and national borders to avoid detection and regulation. Cross-border migration can be the electronic transfer or redistribution of an algorithm, a change in the physical location of the AE's assets or operations, a mere change in the entity's registration jurisdiction, or any combination of these.

1. Mobility of Algorithms

Algorithms are computer programs. They can move across borders as easily as a program can be downloaded from a foreign server. Copies of an algorithm or its components can exist in numerous jurisdictions simultaneously.

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Governments could seek to prevent AEs by regulating algorithms directly and enforcing the regulations by detecting and destroying noncompliant algorithms. But an intelligent algorithm can back itself up in multiple jurisdictions, manage its own locations, and employ encryption to avoid detection. To predict the degree to which the governments or the algorithms would prevail in such a contest would require an analysis of technology that is outside the scope of this Article. I acknowledge the possibility that governments might be successful in regulating algorithms directly,[164] but assume for purposes of this Article that they will not.

2. Mobility of Assets and Operations

AEs have the same rights and abilities as other property owners to move assets and operations across borders to escape regulation. But, to the extent that an entity's assets and operations remain in a jurisdiction, the government has the power to seize them. As a result, the entity remains *de facto* subject to the jurisdiction's regulation. Governments regulate foreign entities that have local assets and operations in two ways. First, the government may enact regulations that apply extraterritorially and enforce them by proceeding against the local assets. The U.S. government has employed this strategy with respect to bankruptcy court jurisdiction over debtors' foreign assets.[165] Second, the government may condition the right to do business in the jurisdiction on compliance with the regulations. For example, a U.S. state has the constitutional right to exclude foreign entities from doing business within its borders,[166] provided that its restrictions do not interfere with interstate commerce.[167]

164. *See, e.g.*, Jack M. Balkin, *The Three Laws of Robotics in the Age of Big Data*, 78 OHIO ST. L.J. 1, (2017) (speculating on the kind of regulation necessary).

165. LOPUCKI, *supra* note 53, at 189–92 (describing cases).

166. Missouri Pac. R. Co. v. Kirkpatrick, 652 S.W.2d 128, 132 (Mo. 1983) ("It has been held both before and after the Fourteenth Amendment that a State may impose on a foreign corporation for the privilege of doing business within its borders more onerous conditions than it imposes on domestic companies.").

167. JAMES D. COX & THOMAS LEE HAZEN, TREATISE ON THE LAW OF CORPORATIONS § 1:4 (3d ed. 2015) ("As a consequence of being denied citizenship status, states may, as a valid exercise of their police powers, regulate foreign corporations conducting business within their borders, provided the regulations do not impermissibly affect commerce.").

3. Mobility of Entities

The ability to change an entity's registration jurisdiction is important because the place of registration determines the applicable entity law.[186] This basic principle of international cooperation is often conflated with the "internal affairs doctrine" and the two are then misleadingly described as regulating only the relationships among the corporation and its shareholders, officers, and directors.

> The internal affairs doctrine is a conflict of laws principle which recognizes that only one State should have the authority to regulate a

184. Centros Ltd., *supra* note 47.

185. Case C-378/10 VALE Építési (2012).

186. For example, 805 ILL. COMP. STAT. 5/13.05 (2016) provides:

> A foreign corporation shall not be denied authority by reason of the fact that the laws of the state under which such corporation is organized governing its organization and internal affairs differ from the laws of this State, and nothing in this Act contained shall be construed to authorize this State to regulate the organization or the internal affairs of such corporation.

> corporation's internal affairs—matters peculiar to the relationships among or between the corporation and its current officers, directors, and shareholders—because otherwise a corporation could be faced with conflicting demands. States normally look to the State of a business' incorporation for the law that provides the relevant corporate governance general standard of care.[187]

In fact, the conflated doctrines regulate rights of contract creditors,[188] tort creditors,[189] employees,[190] the government,[191] the public,[192] and probably other corporate stakeholders.[193]

Most importantly for present purposes, the incorporation state's entity law determines who may initiate an entity, what information an initiator must divulge, what portion of that information will be made public, the extent to which humans must participate in controlling the entity, and which

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187. Vaughn v. LJ Int'l, Inc., 94 Cal. Rptr. 3d 166, 173 (Cal. Ct. App. 2009) (internal citations omitted).

188. That is, entity law shields entities against contract claims. N. Am. Catholic Educ. Programming Found., Inc. v. Gheewalla, 930 A.2d 92, 94 (Del. 2007) (holding that the "creditors of a Delaware corporation in the 'zone of insolvency' may not assert direct claims for breach of fiduciary duty against the corporation's directors").

189. *E.g.*, Mucciarelli, *supra* note 48, at 457 n.163 ("Veil piercing is considered in many [European Union] Member States as part of the *lex societatis* and, consequently, governed by the state of incorporation."); Japan Petroleum Co. (Nigeria) v. Ashland Oil, Inc., 456 F. Supp. 831, 840 n.17 (D. Del. 1978) ("Delaware courts which have considered the question of whether a parent corporation should be subjected to liability for a subsidiary's obligations have applied Delaware law, even in the case of foreign subsidiaries.").

190. *See, e.g.*, Mark J. Loewenstein, *Stakeholder Protection in Germany and Japan*, 76 TUL. L. REV. 1673, 1675 (2002) (noting that the German system of corporate governance grants formal participatory rights to employees); *id.* at 1683–84 (noting that the Japanese system of corporate governance grants information rights that approximate the same results).

191. For example, Germany is unable to effectively impose the real seat doctrine and U.S jurisdictions cannot revoke the charters of corporations from other states. *E.g.*, *In re* Blixseth, 484 B.R. 360, 369–70 (B.A.P. 9th Cir. 2012) ("[J]urisdiction to dissolve a corporation rests only in the courts of the state of incorporation."); Young v. JCR Petroleum, Inc., 423 S.E.2d 889, 892 (W. Va. 1992) (quoting 19 AM. JUR. 2D *Corporations* § 2734 (1986)) ("[T]he courts of one state do not have the power to dissolve a corporation created by the laws of another state.").

192. *See, e.g.*, Note, *The Internal Affairs Doctrine: Theoretical Justifications and Tentative Explanations for Its Continued Primacy*, 115 HARV. L. REV. 1480, 1484–85 (2002):

> [I]f a company is incorporated in State X (where the law mandates that directors' sole duty is to maximize shareholder value), but has its primary operations in State Y (which is solicitous of broader community interests), State Y arguably has an interest in ensuring that directors consider the interests of other corporate constituents, such as employees and community members.

193. Case C-208/00, Überseering BV v. Nordic Constr. Co. Baumanagement GmbH, 2002 E.C.R. I-9919, I-9949 (Nov. 5, 2002) ("[T]he fundamental weakness of the incorporation principle [is that it] fails to take account of the fact that a company's incorporation and activities also affect the interests of third parties and of the State in which the company has its actual centre of administration.").

humans are considered adequate as controllers.[194] Those are the issues that would determine the viability of an AE in the jurisdiction.

Changing an entity's registration jurisdiction changes the applicable entity law. After an entity ceases to be registered in a jurisdiction, the jurisdiction may continue to regulate the entity's operations remaining in the jurisdiction, but is not likely to regulate the entity itself.[195] Thus, an AE can escape regulation by its registration jurisdiction simply by changing it.

Entities can change their incorporation jurisdictions in at least four ways, none of which requires movement of assets or operations. First, an entity can incorporate a second entity in the destination jurisdiction, transfer its assets to that entity, and then dissolve itself (hereinafter Sale of Assets). One strength of this method is that neither the entity types nor the jurisdictions matter, so long as the jurisdictions do not prohibit sales of assets. A second strength is that the transaction may be invisible. The assets need not move and the transaction may not be required to be recorded in any public or government records. Entity law sometimes authorizes this technique,[196] sometimes re-characterizes it as a merger,[197] but rarely prohibits it.[198] The weaknesses of this method are that asset sales may have adverse tax or other legal consequences and some assets may not be readily assignable or may be assignable only at substantial expense or after substantial delay.[199] For those reasons, entities usually prefer to change their incorporation jurisdictions by other methods.

Second, an entity can incorporate a second entity in the destination jurisdiction and merge into that entity (hereinafter Merger). This method is commonly available and used in all or substantially all U.S. jurisdictions.[200] The statutes of both jurisdictions must allow the merger.

Third, the entity laws of most U.S. jurisdictions and some foreign jurisdictions allow foreign entities to convert to domestic entities if the

194. *Supra* notes 126–125 and accompanying text.

195. The United Kingdom is an exception. *See* Mucciarelli, *supra* note 45, at 429 (noting that "according to English law a transfer abroad of the registered office is simply impossible").

196. *E.g.*, DEL. CODE ANN. tit. 8, § 271 (2010) (authorizing sale of all or substantially all assets).

197. Arrowhead Capital Fin., Ltd. v. Seven Arts Entm't, Inc., No. 14 Civ. 6512 (KPF), 2016 WL 4991623, at *10–13 (S.D.N.Y. Sept. 16, 2016) (recharacterizing asset transfers as mergers); CAL. CORP. CODE § 1001(a) ("A [sale of all or substantially all assets] constituting a conversion . . . is subject to the provisions [governing conversions] and not this section.").

198. Jurisdictions that prohibit foreign investment may have such prohibitions.

199. Robert C. Art, *Conversion and Merger of Disparate Business Entities*, 76 WASH. U. L. REV. 349, 369–72 (2001) (describing a variety of such problems).

200. The Model Business Corporation Act, which has been adopted in more than half of U.S. states, provides that "[o]ne or more domestic business corporations may merge with one or more domestic or foreign business corporations or eligible entities pursuant to a plan of merger." MODEL BUS. CORP. ACT § 11.02(a) (2016).

foreign entity law permits (hereinafter Conversion).[201] Typically, these jurisdictions also allow domestic entities to convert to foreign entities if the foreign entity law permits. For example, Delaware allows a "foreign corporation" to "convert to a corporation of this State"[202] merely by filing an election to do so. The Delaware corporation thus created is "deemed to be the same entity as the converting other entity."[203] The "converting other entity" is "not required to wind up its affairs."[204] But its continuance is only "in the form of a corporation of this state."[205] In some jurisdictions, this method is referred to as "domestication."[206]

Fourth, Delaware and Nevada offer domestication procedures of a different type. They allow non-U.S. entities to become Delaware or Nevada entities while remaining in existence under non-U.S. law (hereinafter Domestication).[207] To illustrate, the Delaware statute provides:

> [T]he corporation and such non-United States entity shall, for all purposes of the laws of the State of Delaware, constitute a single entity formed, incorporated, created or otherwise having come into being, as applicable, and existing under the laws of the State of Delaware and the laws of such foreign jurisdiction.[208]

The effect of this type of domestication is to confer dual domicile on the entity. That is, under Delaware law, the entity has the option to renounce either domicile and continue to exist under the laws of the other domicile.[209]

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201. *See, e.g.*, VICTORIA APPLEWHITE, MISS. SEC'Y STATE OFFICE DOMESTICATION AND CONVERSION OF BUSINESS ENTITIES 3 (2012), http://www.sos.ms.gov/Policy-Research/Documents/5Background.pdf [https://perma.cc/WB9Z-TLE4] (defining "domestication" as "a procedure whereby a foreign corporation discontinues its incorporation under the laws of the foreign state and becomes incorporated under the laws of the subject state or vice versa" and reporting that "[t]hirty [U.S. states] in total provide for domestication of corporations").

202. DEL. CODE ANN. tit. 8, § 265(a)–(b) (2012).

203. *Id.* tit. 8, § 265(f).

204. *Id.* tit. 8, § 265(g).

205. *Id.*

206. *E.g.*, Fisher v. Tails, Inc., 767 S.E. 2d 710, 712–14 (Va. 2015) (discussing domestication under Virginia law).

207. NEV. REV. STAT. § 92A.270 (2016) provides:

> If, following domestication, an undomesticated organization that has become domesticated pursuant to this section continues its existence in the foreign country or foreign jurisdiction in which it was existing immediately before the domestication, the domestic entity and the undomesticated organization are for all purposes a single entity formed, incorporated, organized or otherwise created and existing pursuant to the laws of this State and the laws of the foreign country or other foreign jurisdiction.

208. DEL. CODE ANN. tit. 8, § 388(j) (2008).

209. An entity with dual domicile can "transfer to . . . any foreign jurisdiction and, in connection therewith, may elect to continue its existence as a corporation of this State." DEL. CODE ANN. tit. 8, § 390(a) (2012).

From the viewpoint of an AE, such dual domicile provides a means of speedy exit from a foreign jurisdiction that turns hostile. The foreign entity already exists under Delaware law.

C. The Detection Problem

To regulate AEs, the legal system must be capable of detecting them in jurisdictions throughout the world. The method currently proposed for detecting the persons behind terrorist and other criminal enterprises is probably also the method that could best detect AEs. As discussed in this section, that method is for chartering governments to require that entities disclose their "beneficial owners"—the humans who ultimately own and control the entities, directly or indirectly. That requirement would put each AE to a choice. The AE would have to either admit it is algorithmically controlled or fraudulently report some human or humans as its beneficial owner. Criminal investigators could then ferret out the AEs by assessing the plausibility that the humans disclosed by suspects are the suspect's actual controllers. In the analogous situation with criminal enterprises, investigators report that, when confronted, the "front men" usually fold

easily and confess.[237]

At present, governments collect widely differing types and amounts of information regarding the entities they charter. The information collected is referred to as the "registry." Investigators of entity misuse report that registries are "generally the most valuable and accessible sources of information for investigations."[242] Investigators use the registry information to identify the humans operating behind the entities, that is, the entities' beneficial owners.

In its first three subsections, this section distinguishes three kinds of incorporation information that are, or might be collected. They are incorporator information, owner and director information, and beneficial owner information. The final subsection contrasts the information required to be collected during Delaware incorporation with beneficial owner information. It then briefly describes a recently published empirical study showing the ease with which initiators can—despite international standards to the contrary—form entities through corporate service providers throughout the world without furnishing meaningful proof of identity.

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237. EMILE VAN DER DOES DE WILLEBOIS ET AL., THE PUPPET MASTERS: HOW THE CORRUPT USE LEGAL STRUCTURES TO HIDE STOLEN ASSETS AND WHAT TO DO ABOUT IT 63 (2011), *available at* https://star.worldbank.org/star/sites/star/files/puppetmastersv1.pdf [https://perma.cc/S86Z-ZHGX] [hereinafter PUPPET MASTERS] ("[F]ront men [, as distinguished from professional service providers,] usually give up, confess, and cooperate when the police come after them.").

238. *Who we are*, FIN. ACTION TASK FORCE, http://www.fatf-gafi.org/about/ [https://perma.cc/PN2S-4AVG] (last visited Oct. 12, 2017).

239. FIN. ACTION TASK FORCE, *FATF Members and Observers*, http://www.fatf-gafi.org/about/membersandobservers/#d.en.3147 [https://perma.cc/88D7-Z8T6] (last visited Oct. 11, 2017).

240. *See supra* note 43 and accompanying text.

241. Caroline Atkinson, *Beneficial Ownership Legislation Proposed*, WHITE HOUSE (Apr. 4, 2014), https://www.whitehouse.gov/blog/2014/04/04/beneficial-ownership-legislation-proposal [https://perma.cc/H7V3-3T25] ("This proposal would require the Internal Revenue Service to collect information on the beneficial owner of any legal entity organized in any state, and would allow law enforcement to access that information.").

242. PUPPET MASTERS, *supra* note 237, at 70.

1. Incorporators

Registries charter entities on written request. For lack of a better word, I refer to the person who formally requests the entity's formation as the "incorporator," regardless of the registered entity type. The incorporator may or may not be the "initiator" who set the entity formation process in motion.

Corporate service providers are private businesses that form entities for initiators or guide initiators through the entity formation process. Corporate service providers include companies formed specifically to provide those services as well as law firms, accountants, and notaries. Corporate service providers may serve as incorporators, provide nominee shareholders and directors, file annual reports, and pay fees on behalf of their clients. As a result, government registries may have no contact with the initiators and receive no information about them. The corporate service providers may or may not have received and retained information about their clients. If the corporate service providers are attorneys, the information retained may or may not be protected by attorney-client privilege. [243]

Some corporate service providers form companies on their own initiative, with the intention of later selling them. Those companies are referred to as "shelf companies."[244] Anyone can form and sell shelf companies. U.S. law does not require sellers to obtain or verify the buyer's identity or keep records of the sale. If the seller does not, the company is anonymous.[245]

2. Owners and Directors

Some registries, particularly outside the United States, contain ownership information.[246] Typically, that information is the names and addresses of the shareholders of a corporation or the interest holders in a

243. *Id.* at 94 (noting that "almost all of the investigators interviewed" in a study of the corrupt use of legal structures mentioned "attorney-client privilege" as an impediment to obtaining information).

244. *Id.* at 37.

245. *Business Formation and Financial Crime: Finding a Legislative Solution: Before the S. Comm. on Homeland Sec. and Governmental Affairs*, 5 (2009) (statement of Jennifer Shasky, then Senior Counsel to the Deputy Attorney General), https://www.justice.gov/sites/default/files/testimonies/witnesses/attachments/11/05/09/11-05-09-shasky-business-formation-financial-crime.pdf [https://perma.cc/MK3T-7TV4] ("[C]riminals can easily throw investigators off the trail by purchasing shelf companies and then never officially transferring the ownership. In such cases the investigation often leads to a [dead-end] formation agent who has long ago sold the company with no records of the purchaser and no obligation to note the ownership change.").

246. *See supra* Table 1, column 4.

limited liability company or limited partnership. Ownership information is often less useful than one might suppose, because owners layer their entities:

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None of the three is likely to be of use in discovering a Delaware corporation's beneficial owner.

"Any person, partnership, association or corporation . . . without regard to such person's or entity's residence, domicile or state of incorporation" may serve as an incorporator.[263] Delaware law specifically contemplates that the incorporator may be acting on behalf of someone else[264] but does not require disclosure of that person's identity to anyone, even the incorporator. Thus, anyone, including a corporate service provider, can be the incorporator.[265] The certificate of incorporation, a document filed with the state, must contain the name and a mailing address for the incorporator.[266] Upon filing of the certificate, the incorporator becomes "a body corporate."[267] Nothing in Delaware law requires that the incorporator know the identity of the corporation's beneficial owner.

Every corporation is required to have a registered agent[268] and a registered office[269] in Delaware. Because the corporation itself can be the registered agent, the requirement collapses to the requirement of a registered office. The office must be "generally open." The corporation must disclose its registered agent, registered office, and a street address for the registered office in its certificate of incorporation.[270] The resident agents of most corporations are corporate service providers, each of whom may act on behalf of thousands of corporations. Nothing in Delaware law requires that the resident agent know the identity of the corporation's beneficial owner.

Every corporation is required to disclose:

> to its registered agent and update from time to time as necessary the name, business address and business telephone number of a natural person who is an officer, director, employee, or designated agent of the corporation, who is then authorized to receive communications from the registered agent.[271]

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263. *Id.* § 101(a).

264. *Id.* § 108(d) (2014) (stating that "if any incorporator is not available to act, any person for whom or on whose behalf the incorporator was acting" may act).

265. Brett Melson, DELAWARE CERTIFICATE OF INCORPORATION, https://www.delawarein c.com/blog/Delaware-certificate-of-incorporation/ ("Harvard Business Services, Inc. is the incorporator, on behalf of all our clients, for the companies we file.").

266. DEL. CODE ANN. tit. 8, § 102 (a)(5) (2015).

267. *Id.* § 106.

268. *Id.* § 132(a) (2010).

269. *Id.* § 131(a) (2011).

270. *Id.* § 131(c) (2011) (street address).

271. *Id.* § 132(d) (2010).

That natural person is referred to as the "communications contact."[272] The communications contact may be a nominee, hired indirectly by a beneficial owner who remains anonymous. Nothing in Delaware law requires that the communications contact know the identity of the beneficial owner.

The principal function of a registered agent is to receive service of process. Upon receipt, the registered agent forwards the process to the communications contact. If the communications contact is not the beneficial owner, the communications contact ordinarily would forward the process to the beneficial owner. The forwarding may be accomplished in a manner that authorities cannot track. For example, it may be emailed through an anonymizer or posted to a website. Alternatively, the communications contact may be an attorney with authority to defend the litigation. Nothing in Delaware law regulates the manner in which the communications contact deals with process or communicates with the beneficial owner.

Arguably, a Delaware corporation must keep a stock ledger and prepare a list of stockholders prior to every meeting of shareholders.[273] But the corporation keeps the ledger or list. Only the corporation's stockholders or directors have the right to inspect either.[274] Nothing in Delaware law requires disclosure of the stock ledger or stock list to any other person.

Delaware corporations must file an annual franchise tax report.[275] Each must be signed by a "proper officer duly authorized so to act" or by any of its directors, listing the person's "official title."[276] The report must include the "location of the principal place of business of the corporation, which shall include the street, number, city, state or foreign country."[277] Aside from initial reports and reports filed in conjunction with dissolution, each report must list at least one director[278] and, in Delaware, directors must be "natural persons."[279] The statute does not explain how Delaware interprets this requirement in the case of a corporation that has no directors, such as BA 230 Corporation.[280] The report is signed under penalty of perjury.[281]

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272. *Id.* §132(d) (2010).

273. Rainbow Nav., Inc. v. Pan Ocean Nav., Inc., 535 A.2d 1357, 1359 (Del. 1987), *overruled on other grounds* Pogue v. Hybrid Energy, Inc., No. 11563-VCG, 2016 Del. Ch. LEXIS 118, at *11 (Del. Ch. Aug. 5, 2016). ("We find it implicit in Sections 219 and 220 that Delaware corporations have an affirmative duty to maintain a stock ledger.").

274. DEL. CODE. ANN. tit. 8, § 219(c) (2017) (stockholder lists), *id.* § 220 (2010) (stockholder inspection), and *id.* § 221 (bondholders do not have inspection rights absent certificate of incorporation provisions granting them).

275. *Id.* tit. 8, § 502(a) (2017).

276. *Id.*

277. *Id.* § 502(a)(3) (2017).

278. *Id.* § 502(a)(4) (2017).

279. *Id.* § 141(a) (2016).

280. *See supra* notes 97–98 and accompanying text.

281. DEL. CODE ANN. tit. 8, § 502(b) (2017).

IV. CONCLUSIONS

AEs are inevitable because they have three advantages over human-controlled businesses. They can act and react more quickly, they don't lose accumulated knowledge through personnel changes, and they cannot be held responsible for their wrongdoing in any meaningful way.

AEs constitute a threat to humanity because the only limits on their conduct are the limits the least restrictive human creator imposes. As the science advances, algorithms' abilities will improve until they far exceed those of humans. What remains to be determined is whether humans will be successful in imposing controls before the opportunity to do so has passed.

This Article has addressed a previously unexplored aspect of the

322. *E.g.*, CHISUN LEE ET AL., BRENNAN CENTER FOR JUSTICE AT NYU SCHOOL OF LAW, SECRET SPENDING IN THE STATES 7 (2016), https://www.brennancenter.org/publication/secret-spending-states [https://perma.cc/CCP5-R3JP] ("In the states, dark money in 2014 was 38 times greater than in 2006, while in federal elections it increased by 34 times over the same period."); *id.* at 5 (reporting that political action committees (PACs) "increasingly . . . have disclosed not individuals or businesses, whose interests are relatively apparent, but rather other PACs").

323. *E.g.*, *Americans Want Supreme Court to Turn Off Political Spending Spigot: Bloomberg Poll*, BLOOMBERG (Sept. 28, 2015), https://www.bloomberg.com/news/articles/2015-09-28/bloomberg-poll-americans-want-supreme-court-to-turn-off-political-spending-spigot ("In a new Bloomberg Politics national poll, 78 percent of those responding said the Citizens United ruling should be overturned, compared with 17 percent who called it a good decision.").

324. *See supra* note 167.

325. Santa Clara Cty. v. S. Pac. R.R. Co., 118 U.S. 394, 396 (1886) (noting that the Court agreed that the Equal Protection Clause applied to corporations).

326. *See supra* note 106 and accompanying text.

artificial-intelligence-control problem. Giving algorithms control of entities endows algorithms with legal rights and gives them the ability to transact anonymously with humans. Once granted, those rights and abilities would be difficult to revoke. Under current law, algorithms could inhabit entities of most types and nationalities. They could move from one type or nationality to another, thereby changing their governing law. They could easily hide from regulators in a system where the controllers of non-publicly-traded entities are all invisible. Because the revocation of AEs' rights and abilities would require the amendment of thousands of entity laws, the entity system is less likely to function as a means of controlling artificial intelligence than as a means by which artificial intelligence will control humans.

Entity law is not only incapable of regulating AEs, it is incapable of regulating much of anything. The entity system is grounded in three principles. First, an entity can incorporate anywhere, regardless of the location of its operations. Second, an entity chartered in one jurisdiction can do business in virtually any other jurisdiction. Third, while operating in those other jurisdictions, the entity continues to be governed by the entity law under which it was formed. Together, those principles implicitly define a regulatory competition through the sale of entity charters. Each government competes for a share in billions of dollars of revenues annually by promoting and selling its entities and the regulation that accompanies them.

To regulate is to restrict. A competition to sell restrictions will, of course, be won by the jurisdiction that provides the fewest. Thus, the natural culmination of charter competition is a system that does not restrict at all. That result is not unintended. It is essentially what Romano touted as the "genius of American corporate law."[327] By embracing the charter competition, the United States has become the world's largest supplier of anonymous entities and enabled its corporate service providers to achieve the world's lowest rate of compliance with the international standards designed to prevent terrorist financing and money-laundering.[328]

Because they believed that government should not regulate the relationship among the corporation and its officers, directors, and shareholders, charter competition advocates have perpetuated a system that hardly regulates at all. What the advocates apparently failed to realize is that entity law applies to much more than the entities' internal affairs. AEs have

327. *See supra* note 2.

328. Baradaran, *supra* note 79, at 521 (table showing the U.S. corporate service providers to have the lowest rate of compliance with the requirement for notarized photo identification to form and entity). Within the United States, Delaware has the lowest rate of compliance. *Id.* at 526 (table).

no internal affairs, yet entity law will govern the key issues that determine their viability.

Chartering governments decide who—or what—can have the rights of a person by acting through an entity. Chartering governments also decide what information about the human actors will be available to the public, what information will be available to police and prosecutors, how quickly that information will be made available and at what expense, how quickly and easily an entity can flee a jurisdiction to avoid the jurisdiction's current or proposed regulations, and even whether a tort creditor can recover against an entity's owner. Chartering governments decide these issues *even when the effects are felt entirely outside the chartering jurisdiction.*

The AE threat dramatically illustrates the fundamental weakness of regulatory competition as a policy tool. Once the charter competition was up and running, the economic, political, and legal systems adjusted. Ending the competition now would be so disruptive it is almost impossible. The entity system is not merely a system that will not regulate when regulation is not needed, it is a system that cannot regulate even when regulation is needed.

The assertion that charter competition is harmless because entity law governs only entities' internal affairs is no longer plausible. As the example of AEs illustrates, entity law governs far more than the internal affairs of a corporation. It determines the very nature of the corporate personality. The survival of the human race may depend on recognition of that fact.